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Wei Li

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EXAMINER

AHN, SANGWOO

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/643,563	Applicant(s) LI ET AL.	
	Examiner SANGWOO AHN	Art Unit 2168	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 January 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 23, 24, 26-29 and 37, 39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 23, 24, 26-29, 37 and 39 is/are rejected.
- 7) ☒ Claim(s) 38 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Applicant's Communication

1. Applicant's communication filed on 1/12/2009 has been entered.

Finality of the last Office Action mailed on 11/26/2008 has been withdrawn. The Examiner believes that his indication of allowable claims 23 – 24 and 26 – 29 was an error and hereby incorporate the reasons that the aforementioned claims are unpatentable:

Although claim 23 does contain a combination of detailed elements ("I/O cost estimate for a prefix tree based, at least in part on the size of the candidate prefix tree and the amount of memory that can be used to store the candidate prefix tree") that are novel in view of the closest prior art Agrawal, the language in the claim's preamble suggests that the prior does not have to cover the aforementioned features in order to reject the entire claim. The language "wherein the machine-executed operation is at least one of:" can be construed in the following way: as long as the prior art teaches just one of the listed steps A), B), C) and D), the prior art anticipates the present claim.

In order to avoid such interpretation, the Examiner respectfully advises the Applicant to change the aforementioned phrase to "wherein the machine-executed operation *comprises*" or "wherein the machine-executed operation *includes*." Only then, each and every one of the listed steps can be considered a part of the claim that needs to be covered by the prior art.

Claim 37 also has the same problem as indicated above. Appropriate correction is respectfully advised.

It is believed that claims 23 – 24 and 26 – 29 would be allowable once the appropriate changes are made to claim 23.

Response to Arguments

2. Applicant's arguments regarding claim 37 have been fully considered but they are not persuasive.

Applicant mainly argued that the features of “based on conditions existing before the frequent itemset operation is performed in a computing environment in which the frequent itemset operation is to be performed, wherein the conditions include workload of a computer system in which the frequent itemset operation is to be performed, and an amount of volatile memory available to store a candidate prefix tree.”

In response to applicant's arguments against the references individually, Examiner asserts that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

As indicated in the Office Action mailed on 11/26/2008, Examiner contends that Agrawal in view of Agrawal2 teaches all of the aforementioned limitations in the following way:

Agrawal teaches “dynamically selecting which occurrence counting technique to use from a plurality of available occurrence counting techniques based on conditions existing in a computing environment in which the frequent itemset operation is to be performed (C12:L21-32, *First, I/O normally refers to transferring data, so the I/O cost can be interpreted as the cost of transferring data. Second, workload of a computer system and resources available on a computer system are all related to the amount of data and data activity within the system. The cost estimation in Agrawal is based on a number of data characteristics like the number of items, total number of transactions, average length of a transaction, etc. These parameters suggest that the cost estimation is essentially based on how much data is being transferred (number of transactions), workload (number of transactions, average length of transactions) and resources available (the more the number of items or transactions, the less the available resources → also pertains to volatile memory available as the memory is also a resource). The recited conditions on which the cost estimation is based are well known in the data processing art to be the purpose of “cost estimation” within the computing environment, which is to lessen the workload and to increase the available resources, et seq.*), wherein the conditions include workload of a computer system in which the frequent itemset operation is to be performed, and an amount of volatile memory available to store a candidate prefix tree (C11:L17-33, *First, I/O normally refers to transferring data, so the I/O cost can be interpreted as the cost of transferring data. Second, workload of a computer system and resources available on a computer system are all related to the amount of data and data activity within the system, et seq.*).”

Agrawal2 teaches that “conditions used in selection process are which occur before the actual operation is performed (column 2 line 65 - column 3 line 7: the total cost of the workload is calculated, several different sets of Indexes and materialized views are measured in this manner to find the best set since building them can be very expensive due to updates and storage constraints, column 7 lines 49 - 54, et seq.).”

For the foregoing reasons (and also for the reason indicated under the section “Response to Applicant’s Communication”), rejection of claim 37 is hereby sustained.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 23 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent Number 6,324,533 issued to Rakesh Agrawal et al. (hereinafter “Agrawal”).

Regarding claim 23, Agrawal discloses (See “Response to Applicant’s Communication”),

A method comprising performing a machine-executable operating involving instructions, wherein the machine-executed operation is at least one of:

A) sending said instructions over transmission media (Figure 1);

B) receiving said instructions over transmission media (Figure 1);

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C) storing said instructions onto a machine-readable storage medium (Figure 1);
and

D) executing the instructions;

wherein said instructions are instructions which, when executed by one or more processors, cause the performance of a frequent itemset operation by performing the steps of:

dynamically selecting which occurrence counting technique to use from a plurality of available occurrence counting techniques (C3:L19-21, et seq.) by performing the steps of:

generating cost estimates for each of the plurality of available occurrences counting techniques based on an estimated I/O cost of using the available occurrence counting technique (C12:L34-37, et seq.);

wherein generating cost estimates for each of the plurality of available occurrence counting techniques based on an estimated I/O cost estimate comprises:

determining a size of a candidate prefix tree;

determining an amount of memory that can be used for the candidate prefix tree;

comparing the size of the candidate prefix tree to the amount of memory that can be used to store the candidate prefix tree; and

generating an I/O cost estimate for a prefix tree technique based, at least in part, on the size of the candidate prefix tree and the amount of memory that can be used to store the candidate prefix tree and selecting the occurrence counting technique that has the lowest estimated cost; and during said frequent itemset operation, using said selected occurrence counting technique to count occurrences of at least one combination to determine whether said at least one combination satisfies frequency criteria associated with said frequent itemset operation (C3:L23-24, et seq.).

Regarding claim 29, Agrawal discloses determining that a particular occurrence counting technique will not be considered during any phase of the frequent itemset operation, and performing the frequent itemset operation without performing startup operations for said particular occurrence counting technique (C11:L40-44, et seq.).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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6. Claims 24 and 26 – 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Agrawal in view of High Performance Mining of Maximal Frequent Itemsets written by Gosta Grahne and Janfei Shu (hereinafter “Grahne”).

Regarding claims 24, Agrawal discloses the method of claim 23.

Agrawal does not explicitly disclose prefix tree technique.

However, Grahne discloses the prefix tree technique in page 2 § 1 Introduction, ¶ 5; page 3, § 2.1 FP-Tree and FP-Growth Method, ¶ 2).

One of ordinary skill in the art at the time of invention would have recognized that the methods disclosed in Grahne comprise the details of a subset of the method taught by Agrawal. It would have been obvious to one of ordinary skill in the art at the time of invention to have combined the teachings of Agrawal and Grahne because they are both focused on knowledge within the domain of data mining. Specifically, Grahne state on page 10 § 4 ¶ 1 that their “paper studies the performance of algorithms for mining frequent itemsets,” which would clearly be of importance to the frequent itemset mining stage of the association rule mining method of Agrawal. Thus, it would have been obvious to one of ordinary skill in the art at the time of invention to have combined the teachings of Agrawal and Grahne.

Regarding claim 26 – 27, Agrawal discloses the method of claim 23.

Agrawal does not explicitly disclose bitmap intersection technique.

However, Grahne discloses the bitmap intersection technique in page 2 § 1 Introduction, ¶ 5; page 3, § 2.1 FP-Tree and FP-Growth Method, ¶ 2).

One of ordinary skill in the art at the time of invention would have recognized that the methods disclosed in Grahne comprise the details of a subset of the method taught by Agrawal. It would have been obvious to one of ordinary skill in the art at the time of invention to have combined the teachings of Agrawal and Grahne because they are both focused on knowledge within the domain of data mining. Specifically, Grahne state on page 10 § 4 ¶ 1 that their “paper studies the performance of algorithms for mining frequent itemsets,” which would clearly be of importance to the frequent itemset mining stage of the association rule mining method of Agrawal. Thus, it would have been obvious to one of ordinary skill in the art at the time of invention to have combined the teachings of Agrawal and Grahne.

Regarding claim 28, Agrawal discloses the method of claim 23.

Agrawal does not explicitly disclose bitmap intersection technique and prefix tree technique.

However, Grahne discloses the bitmap intersection technique and the prefix tree technique in page 2 § 1 Introduction, ¶ 5; page 3, § 2.1 FP-Tree and FP-Growth Method, ¶ 2).

One of ordinary skill in the art at the time of invention would have recognized that the methods disclosed in Grahne comprise the details of a subset of the method taught by Agrawal. It would have been obvious to one of ordinary skill in the art at the time of invention to have combined the teachings of Agrawal and Grahne because they are both focused on knowledge within the domain of data mining. Specifically, Grahne state on page 10 § 4 ¶ 1 that their “paper studies the performance of algorithms for mining

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frequent itemsets,” which would clearly be of importance to the frequent itemset mining stage of the association rule mining method of Agrawal. Thus, it would have been obvious to one of ordinary skill in the art at the time of invention to have combined the teachings of Agrawal and Grahne.

7. Claims 37 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Number 6,324,533 issued to Rakesh Agrawal et al. (Agrawal) in view of U.S. Patent Number 6,513,029 issued to Sanjay Agrawal et al. (Agrawal2).

Regarding claim 37, Agrawal discloses,

A method comprising performing a machine-executable operating involving instructions, wherein the machine-executed operation is at least one of:

A) sending said instructions over transmission media (Figure 1, column 4, et seq.);

B) receiving said instructions over transmission media (Figure 1, column 4, et seq.);

C) storing said instructions onto a machine-readable storage medium (Figure 1, column 4, et seq.); and

D) executing the instructions (Figure 1, column 4, et seq.);

wherein said instructions are instructions which, when executed by one or more

processors, cause the performance of a frequent itemset operation by performing the steps of:

dynamically selecting which occurrence counting technique to use from a plurality of available occurrence counting techniques based on

conditions existing in a computing environment in which the frequent itemset operation is to be performed (C12:L21-32, *First, I/O normally refers to transferring data, so the I/O cost can be interpreted as the cost of transferring data. Second, workload of a computer system and resources available on a computer system are all related to the amount of data and data activity within the system. The cost estimation in Agrawal is based on a number of data characteristics like the number of items, total number of transactions, average length of a transaction, etc. These parameters suggest that the cost estimation is essentially based on how much data is being transferred (number of transactions), workload (number of transactions, average length of transactions) and resources available (the more the number of items or transactions, the less the available resources → also pertains to volatile memory available as the memory is also a resource). The recited conditions on which the cost estimation is based are well known in the data processing art to be the purpose of “cost estimation” within the computing environment, which is to lessen the workload and to increase the available resources, et seq.*), wherein the conditions include workload of a computer system in which the frequent itemset operation is to be performed, and an amount of volatile memory available to store a candidate

prefix tree (C11:L17-33, *First, I/O normally refers to transferring data, so the I/O cost can be interpreted as the cost of transferring data. Second, workload of a computer system and resources available on a computer system are all related to the amount of data and data activity within the system, et seq.*); and

during said frequent itemset operation, using said selected occurrence counting technique to count occurrences of at least one combination to determine whether said at least one combination satisfies frequency criteria associated with said frequent itemset operation (C3:L23-24, et seq.).

Agrawal does not explicitly disclose that conditions are which occur before the actual operation is performed.

However, Agrawal2 discloses that conditions used in selection process are which occur before the actual operation is performed (column 2 line 65 - column 3 line 7: the total cost of the workload is calculated, several different sets of Indexes and materialized views are measured in this manner to find the best set since building them can be very expensive due to updates and storage constraints, column 7 lines 49 - 54, et seq.). At the time of the invention, it would have been obvious to a person of ordinary skill in the data processing art to modify Agrawal's method of selecting itemset counting technique to incorporate Agrawal2's method of using conditions which occur before the

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actual operation such as workload and storage constraint, thus enabling system which provides better recommendations and which makes the selection process faster.

Regarding claim 39, Agrawal discloses determining that a particular occurrence counting technique will not be considered during any phase of the frequent itemset operation, and performing the frequent itemset operation without performing startup operations for said particular occurrence counting technique (C11:L40-44, et seq.).

Allowable Subject Matter

8. Claims 23 contains allowable subject matter.

9. The closest prior art Agrawal teaches in the same field of the invention, an integrated database and data-mining system, related to selecting itemset counting technique using cost calculation. However, Agrawal fails to disclose the combination of detailed elements in claim 23, including “wherein generating cost estimates for each of the plurality of available occurrence counting techniques based on an estimated I/O cost comprises: determining a size of a candidate prefix tree ... generating I/O cost estimate for a prefix tree technique based, at least in part on the size of the candidate prefix tree and the amount of memory that can be used to store the candidate prefix tree”.

Agrawal teaches the itemset counting technique selection process but fails to specify what parameters are taken into consideration. The above features in conjunction with all other limitations of the dependent and independent claims 23 – 24 and 26 – 29 are allowable if the “at least one” language in the preamble of claim 23 is corrected, as indicated in the Response to Applicant’s Communication section.

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10. Claim 38 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, and also the “at least one of” language in the preamble of claim 37 is corrected, as indicated in the Response to Applicant’s Communication section.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to SANGWOO AHN whose telephone number is (571)272-5626. The examiner can normally be reached on M-F 10-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Tim Vo can be reached on (571) 272-3642. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/Tim T. Vo/

Supervisory Patent Examiner, Art Unit 2168

1/26/2009

/Sangwoo Ahn/

Examiner, Art Unit 2168